

REMARKS

This Amendment is in response to the Office Action dated December 15, 2004, in which claims 1-20 were initially rejected. Applicants respectfully request reconsideration and allowance of all pending claims in view of the above-amendments and the following remarks.

I. SUMMARY OF THE DISCLOSURE

The disclosure relates to equalisation of a MC-CDMA (Multi-Carrier Code Division Multiple Access) signal. One embodiment of the disclosure provides a new technique for equalisation, or for detection. The technique is more efficient than the techniques known from the prior art, in particular when the system is not operating at full load, that is to say when a number of users is less than the length L_c of the spread code.

The Applicants wish to maintain the scope of the set of claims as filed, but also to express more clearly claim 1. Claim 1 is amended to specify that the equalisation stage comprises, for each of the components of said transformed signal, at least one equalisation element representative of disturbances affecting the carrier carrying said component, at least one equalisation element representative of disturbances affecting at least one other of said carriers, and at least one element representative of some of said spread codes.

II. CLAIM REJECTION UNDER §102(b)

Claims 1, 11 and 12, were rejected under §102(b) as being anticipated by Applicants' Admitted prior art (AAPA) as represented by Figure 1.

A. **AAPA**

The Examiner considers that the wording "takes into account" is a broad limitation, and includes in particular the technique presented in view of figure 1.

He also considers that disturbances affecting the carrier carrying the component, or other carriers, or at least

some of the spread code are not clearly defined, and do not delimit claim 1 correctly.

B. Claim 1 is not anticipated by AAPA

As mentioned above, the Applicants wish to maintain the scope of the set of claims as filed, but also to express more clearly claim 1.

In amended claim 1, the equalisation technique is different from the one cited in prior art AAPA, in that the equalisation stage takes into account :

- disturbances affecting the carrier frequency,
- disturbances affecting at least another frequency,
- at least some of the spread codes (and not "disturbances affecting" the spread codes), meaning at least 2 spread codes.

The disturbances taken into account are thus the disturbances affecting the carrier frequency and at least another frequency.

The differences between prior art AAPA and the invention are clearly disclosed in the Application's specification: it clearly specifies that the various equalisation techniques described in the prior art do not take account of at least another carrier or at least a spread code used by another user.

More precisely, concerning AAPA, the specification indicates:

- page 4, lines 31-32: "without taking into account interference between users";
- page 5, lines 1-3: "the signal received is equalised (...) by multiplying each symbol received by a

coefficient g_k belonging to each sub-carrier";

- page 6, lines 9-11: "the equalisation traditionally proposed (...) is aimed at minimizing independently on each carrier k (...)";
- page 7, lines 5-8: "the equalisation function is thus carried out on each sub-carrier independently by multiplying (...)";
- page 7, lines 34-35: "prior art techniques, which rely simply on the application of a multiplication coefficient on each component".

As a result, nothing in the AAPA can lead persons of ordinary skill in the art to think of an equalisation stage comprising, for each of the components of the transformed signal, at least one equalisation element representative of disturbances affecting the carrier carrying said component, at least one equalisation element representative of disturbances affecting at least one other of said carriers, and at least one element representative of some of said spread codes.

Consequently, the equalisation technique suggested in the AAPA does not rely on the knowledge of spread codes used by at least another user (whereas claim 1 requires taking into account at least some spread codes of the active users). The AAPA is clearly not relevant to the invention.

Since the equalisation technique suggested in the AAPA does not anticipate each and every element of claims 1, 11 and 12, the Applicants respectfully request that the rejection of these claims under §102(b) be withdrawn.

III. REJECTION UNDER §103(a) BASED ON JEON ET AL. DOCUMENT

Claims 2-7 and 13-20 were rejected under §103(a) as being unpatentable over the AAPA in view of Jeon et al., "An equalisation Technique for OFDM and MC-CDMA in a Time-varying Multipath Fading Channels."

As mentioned above the AAPA is not relevant to the disclosure and especially to the invention recited in claim 1. The combination of AAPA and Jeon et al. is also not relevant to claims 2-7 and 13-20.

Since the AAPA isn't relevant to the invention and especially to claim 1, the combination of the AAPA and Jeon et al. is also not relevant to claims 2-7 and 13-20.

More precisely, in Jeon, the MMSE criterion is applied to a signal of the MC-CDMA type. As illustrated by the equation (21) of the aforesaid document, the goal is to minimize the mean square error on the signal in the frequency domain at the output of the FFT demodulation.

The method described in Jeon resides on a minimization of the mean square error sub-carrier by sub-carrier by taking into account inter-carrier interference.

On the other hand, Jeon does not disclose nor suggest taking into account at least one element representative of some spread codes.

In other words, the purpose of the equalisation technique of the present disclosure is to minimize the mean square error for the received signal as a whole, by integrating the de-spreading functions into it, for example according to the equation (10) of the specification. The technique of the present disclosure thus requires taking into account the different spread codes of the active users.

The Applicants wish to express more clearly claim 1, such that it specifies that the equalisation stage comprises, for each of the components of said transformed signal, at least one equalisation element representative of disturbances affecting the carrier carrying said component, at least one equalisation element representative of disturbances affecting at least one other of said carriers, and at least one element representative of some of said spread codes.

The equations 21 and 22 of Jeon do not include such element representative of some of said spread codes.

Therefore, Jeon is clearly not relevant to the present claims, since it does not disclose nor suggest the major feature according to which the equalisation stage comprises at least one element representative of some of said spread codes.

As a matter of fact, there is neither suggestion nor incentive to provide for equalisation stage comprising at least one element representative of some of said spread codes. Claims 2-7 and 13-20 are therefore novel and non obvious.

Further, one or more of dependent claims 2-7 and 13-20 add further elements and/or limitations that are neither taught nor suggested by the cited references.

Applicants therefore respectfully request that the rejection of claims 2-7 and 13-20 under §103(a) be withdrawn.

IV. CLAIM REJECTION UNDER §103(a) BASED ON AAPA AND THE JEON AND HUANG DOCUMENTS

Claims 8-10 were rejected under §103(a) as being unpatentable over the AAPA and the Jeon patent as applied to claims 2-7 and 11-20 above and further in view of Huang et al., U.S. Patent No. 6,154,443.

As discussed above, the AAPA is not relevant to the disclosure and especially to the invention recited in claim 1, and the combination of AAPA, Jeon et al. and Huang et al. is also not relevant to claims 8-10.

Huang et al. relates to a CDMA communications and particularly to a RAKE receiver for interference cancellation of CDMA signal.

Huang et al. especially discloses techniques of cancellation of interference in a system of the CDMA type, and never discloses a technique of equalisation in a system of the MC-CDMA type.

Consequently, Huang et al. is clearly not relevant to

the invention, since it does not disclose nor suggest a technique of equalisation in a system of the MC-CDMA type.

Therefore, there is neither suggestion nor incentive to one skilled in the art to combine a technique of cancellation of interference in a system of the CDMA type and a technique of equalisation in a system of the MC-CDMA type.

Even if one skilled in the art has ever thought of combining AAPA, Jeon and Huang et al., the combination would not have led to the solution of the invention, which proposes an equalisation stage comprising at least one equalisation element representative of disturbances affecting the carrier carrying said component, at least one equalisation element representative of disturbances affecting at least one other of said carriers, and at least one element representative of some of said spread codes.

The Applicants therefore respectfully request the rejection of claims 8-10 under §103(a) be withdrawn.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

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